

RD-A141 883

THE MULTINATIONAL F-16 AIRCRAFT PROGRAM: ITS PROGRESS
AND CONCERNS(U) GENERAL ACCOUNTING OFFICE WASHINGTON DC
PROCUREMENT AND SYSTEMS ACQUISITION DIV 25 JUN 79
GAO/PSAD-79-63

1/1

UNCLASSIFIED

F/G 5/1

NL

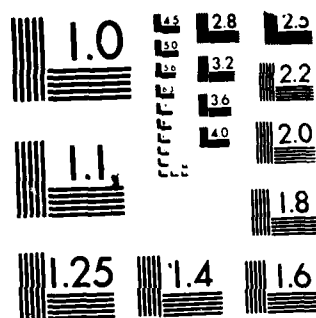
END

DATE

FILED

7-84

DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DTIC FILE COPY

(b) 1. The following are the names of the persons

10,557.0

The main motivation for introducing the μ has already been given. It has created a connection with the previously mentioned present consequences of the model. These include the

- is possible to meet the only desideratum of a self-regulating system:
- control activity is to be in the informational channel of a progressively active state.
- It is, of course, a *post hoc* argument for the laws of thermodynamics.
- control activity is to be exchange activity, and
- exchange activity is to be a variability of activity proper.

To illustrate the proposed development of the F-16 and future aircraft structures, the STS-1000 program was divided into three major development phases. The first phase is the development of a conceptual design and the second phase is the development of a preliminary design. The third phase is the development of a detailed design and the fourth phase is the development of a final design. The development of a conceptual design is the most important phase of the design process. It is the phase in which the design team first defines the problem and the requirements of the aircraft. It is the phase in which the design team first defines the overall architecture of the aircraft. It is the phase in which the design team first defines the overall configuration of the aircraft. It is the phase in which the design team first defines the overall layout of the aircraft. It is the phase in which the design team first defines the overall structure of the aircraft. It is the phase in which the design team first defines the overall system of the aircraft. It is the phase in which the design team first defines the overall mission of the aircraft. It is the phase in which the design team first defines the overall performance of the aircraft. It is the phase in which the design team first defines the overall cost of the aircraft. It is the phase in which the design team first defines the overall risk of the aircraft. It is the phase in which the design team first defines the overall schedule of the aircraft. It is the phase in which the design team first defines the overall budget of the aircraft. It is the phase in which the design team first defines the overall impact of the aircraft. It is the phase in which the design team first defines the overall legacy of the aircraft. It is the phase in which the design team first defines the overall future of the aircraft. It is the phase in which the design team first defines the overall legacy of the aircraft. It is the phase in which the design team first defines the overall future of the aircraft.



DTIC
ELECTE
JUN 08 1984
S E D

PSAD 79.63
JUNE 25, 1979

84 06 07 053

This document has been approved
for public release and sale; its
distribution is unlimited.





COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-163058

To the President of the Senate and the
Speaker of the House of Representatives

The F-16 multinational aircraft program is a multi-billion dollar cooperative undertaking between the United States and four small North Atlantic Treaty Organization countries. The program is complicated by a requirement that the United States place contracts totaling about \$1.6 billion (in January 1975 dollars) with contractors located in these countries--Belgium, Denmark, the Netherlands, and Norway.

This report discusses the progress and major program concerns requiring further attention and resolution. The report contains recommendations to the Secretary of Defense designed to improve the F-16 program's management.

We are sending copies of this report to the Director, Office of Management and Budget, and the Secretaries of Defense and State.

James B. Heath
Comptroller General
of the United States

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

THE MULTINATIONAL F-16
AIRCRAFT PROGRAM: ITS
PROGRESS AND CONCERNS

D I G E S T

The multinational F-16 aircraft program requires the United States to place contracts totaling about \$1.6 billion (January 1975 dollars) with producers in Belgium, Denmark, the Netherlands, and Norway.

At least 1,073 aircraft will be produced--348 for European countries, 650 for the U.S. Air Force, and 75 for Israel. Additional third-country sales are contemplated. The approved sale of 160 aircraft to Iran was recently canceled by that Government. The U.S. Air Force plans to buy 738 additional F-16s, but the extent of European participation in that purchase has not been determined.

The coproduction requirement has created numerous management challenges. All participants working cooperatively have met the challenges thus far.

U.S. contractors have issued purchase orders totaling over \$1.4 billion to 30 European coproducers, about \$180 million less than needed to achieve the U.S. coproduction offset commitment of 58 percent. Most of the purchase orders have been placed in Belgium and the Netherlands, because their aerospace industry had the greater capacities. Denmark and Norway want a more equitable sharing. Air Force officials are searching for ways to make up the shortfall and, to the extent possible, place additional purchase orders in the two Scandinavian countries.

It has been necessary for U.S. contractors to supply more parts and components to European manufacturers than initially planned, to validate the interchangeability of production lines and keep production on schedule until parts manufactured in Europe were available. One company has had serious financial and

management problems, and there is a continuing need to monitor its performance closely. (See pp. 4 and 5.)

Europeans continue to be concerned at the manner in which the overhead of U.S. contractors allocated to the European coproducers' products increases the cost of European parts and aircraft. Although this has been the subject of several task force studies, it is still unresolved. (See pp. 6 to 8.)

At least two European coproducers have profited in converting their currency to U.S. dollars, and others are suspected of doing the same thing. This is a violation of the Memorandum of Understanding between the United States and the European participating governments. Actions are underway to control this matter. In addition, due to the dollar's decline, the United States has been subjected to increased costs under the F-16 program. The cost to the United States due to unfavorable currency conversion rates could be over \$83 million. (See pp. 8 to 11.)

European government and industry officials have pointed out serious difficulty in complying with U.S. procurement regulations and cost accounting standards. They would like some relief from certain U.S. requirements before they participate in future coproduction arrangements and have suggested they be allowed to follow their own government regulations or modified versions of U.S. regulations adaptable to European business practices. Recently the Cost Accounting Standards Board granted an exemption to most of the cost accounting standards for contracts and subcontracts with foreign concerns. (See pp. 11 and 12.)

Although government and industry officials expressed confidence that European industry could increase production to support third-country sales, there remains some question as to the willingness of European governments to do so because of political concern about the coproduction of items for export to certain countries.

European participating government officials, however, see no insurmountable problems and expect their countries to receive the benefit of all sales, perhaps by producing parts for U.S. aircraft instead of third countries. (See pp. 12 and 13.)

Although the Undersecretary of Defense, Research and Engineering, stated that the Department of Defense is attempting to refine an annual estimate of the cost impact of coproduction on the U.S. Air Force 650 aircraft program, no estimate was made in 1978. The Air Force has subsequently directed that data be developed, and the results of this study should be available this year. (See pp. 13 to 15.)

Although General Dynamics Corporation offered a reliability improvement warranty to the Air Force on some F-16 avionics components, its proposal to the European participating governments for a similar warranty was unacceptable to them. Consequently, the United States negotiated a combined U.S./European participating government warranty.

The single warranty would have cost \$62.67 per flying hour, but the United States share of the combined warranty is projected to be \$108.50 per flying hour. By sharing the reliability improvements warranty program with the European participating governments, the United States is obtaining the warranty it was originally offered, but for less aircraft and at a substantially increased cost. (See pp. 15 and 16.)

The Air Force and Pratt and Whitney Aircraft disagree as to the definition of a fiscal year 1975 dollar. If the Air Force argument prevails, Pratt and Whitney Aircraft will have to absorb any costs over the \$1.445 million (January 1975 dollars) engine not-to-exceed price specified in the Memorandum of Understanding. If Pratt and Whitney Aircraft's argument prevails, the European participating governments will have to pay about \$27 million more than anticipated and will have to absorb any future engine cost increases up to \$64 million (1975 dollars). (See pp. 18 and 19.)

The F-16 will provide a standardized weapon system for five North Atlantic Treaty Organization (NATO) countries. Emphasis has been placed on maintaining commonality between U.S. and European participating government aircraft. Most engineering changes have been accepted by all participating nations, although the development costs of these changes are not always shared by participating countries. In addition, efforts are underway to demonstrate the feasibility of using JP-8 as the NATO standard aircraft fuel. If no problems develop, the U.S. Air Force could convert its entire European force, including the F-16 to JP-8. This change to JP-8 fuel would improve NATO interoperability. (See pp. 19 to 23.)

Except for the British BL-755 cluster bomb and the French MATRA-250 general purpose bomb, the F-16 will have little interoperability with the armament of other NATO countries. Efforts are underway to encourage more tactical and operational cooperation, including such areas as common supply, maintenance, and training. (See p. 23.)

U.S. contractors have made new technology available to European manufacturers through the F-16 program. Although many examples can be cited, some European government and industry officials believe that technology transfer has not been as extensive as originally expected. (See pp. 23 to 25.)

In view of the many restrictions on data access, imposed on GAO by the U.S. Air Force and the contractors, GAO has no assurance that its review has identified all the important issues associated with the F-16 multinational program.

RECOMMENDATIONS

The F-16 Program Director and other Air Force and contractor officials are aware of the concerns in the multinational aircraft program and have acted to alleviate most of them. The following recommendations are additional actions necessary to improve F-16 program management.

The Secretary of Defense should:

- Establish a consistent practice for U.S. dealings with European governments and industries in coproduction programs in consultation with the Cost Accounting Standards Board and the Office of Federal Procurement Policy.
- Require that cost estimates on the impact of coproduction on U.S. Air Force aircraft costs be made at least annually.
- Determine whether a prompt resolution of the disagreement between the Air Force and Pratt and Whitney Aircraft regarding the definitions of the term fiscal year 1975 dollars is needed to help the European participating governments and the U.S. Government in assessing this cost impact.
- Require the Air Force to review the cost sharing of all approved and future F-16 engineering changes to make sure development costs are shared according to the Memorandum of Understanding.

A draft of this report was reviewed by cognizant F-16 program officials, and their comments have been incorporated as appropriate.

Tear Sheet

BLANK

C o n t e n t s

		<u>Page</u>
DIGEST		i
CHAPTER		
1	INTRODUCTION	1
	Scope of review	2
	Access to records	2
2	PROGRESS AND CONCERNS OF THE F-16 MULTINATIONAL PROGRAM	3
	Status of EPG coproduction	3
	Coproduction offset	5
	Allocation of U.S. loadings to European products	6
	Conversion of currencies	8
	Problems caused by U.S. procure- ment laws and regulations	11
	EPG participation in third- country sales	12
	Cost impact of coproduction on USAF aircraft	13
	Reliability improvement warranty	15
3	F-16 PROGRAM OBJECTIVES AND BENEFITS FOR EUROPEAN PARTICIPATING GOVERN- MENTS	17
	Acquisition of low-cost aircraft	17
	Maintaining commonality between USAF and EPG F-16s	19
	Standardization of NATO aircraft enhanced by F-16 procurement	22
	Transfer of advanced technology to EPG coproducers	23
	Use of European economic and industrial resources	25
4	CONCLUSIONS AND RECOMMENDATIONS	29
	Conclusions	29
	Recommendations	32

ABBREVIATIONS

CAS	Cost Accounting Standards
ECP	Engineering Change Proposal
EPG	European Participating Government
GD	General Dynamics Corporation
MOU	Memorandum of Understanding
NATO	North Atlantic Treaty Organization
P&WA	Pratt and Whitney Aircraft
SPO	System Program Office
USAF	United States Air Force
RIW	reliability improvement warranty

CHAPTER 1

INTRODUCTION

The decision in June 1975 by the European Participating Governments (EPGs)--Belgium, Denmark, the Netherlands, and Norway--to purchase the F-16 air combat fighter created the F-16 multinational aircraft program. This program provides that EPG industry will share in the production of aircraft for EPG, U.S., and third-country sales. The current program provides for coproduction of 1,073 F-16 aircraft--48 for EPGs, 650 for the United States, and 75 for Israel. The approved sale of 160 aircraft to Iran was recently cancelled by that Government. Additional third-country sales are contemplated.

The Memorandum of Understanding (MOU) between the United States and the four EPGs provides that U.S. contractors will place contracts with European industry equal to 58 percent of the procurement value of the 348 European aircraft. This will be accomplished by having the Europeans participate in the production of their own aircraft and 650 U.S. Air Force (USAF) aircraft. The Europeans will also participate in production of third-country sales. The USAF ultimately plans to buy 738 additional aircraft; however, EPG industry participation beyond the initial 650 USAF program has not been determined.

Although the F-16 multinational program contains unusual provisions for coproduction, it follows foreign military sales procedures that call for selling the aircraft on a government-to-government basis. Under this plan, all F-16s will be built by the U.S. prime aircraft contractor General Dynamics Corporation (GD), for the U.S. Government, which will transfer the aircraft to the purchasing country.

The MOU is the basic charter for implementing the F-16 multinational program. According to the MOU, the EPG program objectives are to

- acquire a low cost, easily maintained aircraft with advanced avionics and weapons capability;
- standardize aircraft in the North Atlantic Treaty Organization (NATO);
- acquire advanced technology; and
- make optimum use of EPG industrial, economic, and technical resources in the production of the aircraft.

This report is to inform the Congress of the F-16 multinational program's progress and concerns that could affect the outcome of the multinational effort and the USAF procurement of the F-16 aircraft.

SCOPE OF REVIEW

We made our review at USAF Headquarters, Washington, D.C.; the F-16 System Program Office (SPO) and the F100 Joint Engine Project Office, Wright-Patterson Air Force Base, Ohio; the Contract Administrative Services--Europe, Brussels, Belgium; General Dynamics Corporation (GD), Fort Worth, Texas, and Brussels, Belgium; and the Pratt and Whitney Aircraft (P&WA) Group of United Technologies Corporation, West Palm Beach, Florida, and Brussels, Belgium.

We also discussed the program with Government representatives and officials of selected coproduction contractors in Belgium, Denmark, the Netherlands, and Norway. Information was obtained from discussions with USAF, EPG, and contractor officials and by reviewing program documentation to the extent it was made available. Our review was conducted during the period January through August 1978.

ACCESS TO RECORDS

Our review was hampered and delayed because we did not have complete access to F-16 program records and responses to our requests for information were untimely. The F-16 SPO refused to grant us access to official letters and messages of USAF Headquarters, and Air Force Systems Command because they considered these documents internal working papers. Numerous briefings, trip reports, and official correspondence were not released to us. Other documents were released to us only after prolonged delays covering several months. Similarly, GD, P&WA, and SPO officials denied us information we considered necessary for our examination.

In view of these many restrictions, we have no assurance that our review has identified all the significant issues associated with the F-16 multinational program.

CHAPTER 2

PROGRESS AND CONCERNS OF THE

F-16 MULTINATIONAL PROGRAM

The F-16 multinational program is a multibillion dollar cooperative undertaking between the United States and four small European NATO countries. The program is complicated by a requirement that the United States place contracts totaling about \$1.6 billion (January 1975 dollars) with contractors located in the four EPGs. Coproducing the F-16 has created numerous challenges not present in the acquisition of other U.S. aircraft. These include identifying parts and components suitable for coproduction; selecting capable European contractors with reasonably competitive prices; negotiating contract terms; complying with U.S. procurement regulations, Cost Accounting Standards (CAS), and coproduction offset requirements; and meeting other coproduction program commitments. However, all participants--the USAF, GD, P&WA, U.S. subcontractors, and the EPGs and coproducers--are working together to meet these challenges and to achieve the program objectives. This chapter discusses the progress and major program concerns requiring further attention and resolution.

STATUS OF EPG COPRODUCTION

About 60 purchase orders have been awarded to 30 coproducers in the four EPGs. Additional purchase orders will be awarded for coproduction of the avionics intermediate shop, flight training simulator, and threat warning system. Although it was initially intended that coproduction contracts be awarded by October 1975, the first was not signed until July 1976. Delays were encountered in identifying items suitable for coproduction, selecting coproducers with reasonably competitive prices, and resolving differences between EPG and U.S. business practices, including procurement, cost accounting, and quality control regulations and standards.

During the initial phase of the coproduction effort, GD, P&WA, and other U.S. companies have had to supply more parts, components, subassemblies, engines and aircraft to some European manufacturers than originally planned. They did this to validate the interchangeability of production lines and to keep the EPG production program on schedule until the produced parts of European manufacturers are available. GD will assemble the first three EPG aircraft at Fort

Worth, disassemble them, and ship them to the EPG aircraft assemblers in Europe. Two were shipped to the Sonaca assembly plant, Gosselies, Belgium, in June 1978; and the third was shipped to Fokker Schiphol, the Netherlands, in September 1978. P&WA will manufacture and assemble the first seven F-16 engines initially scheduled for manufacture and assembly by EPG engine contractors. These engines are being shipped to Europe for mating with the airframes for EPG aircraft deliveries.

Concern over performance
of major EPG coproducer

Fairey SA of Belgium, one of the initial major F-16 European coproducers, was to manufacture components for U.S. and EPG aircraft and assemble 174 of the EPG aircraft. On October 12, 1977, Fairey Limited of London, the parent company of the Belgian coproducer, declared bankruptcy; and Fairey SA was forced into receivership although its manufacturing operations continued.

In May 1978, a new corporation called Sonaca was formed to take over the military activities of the Fairey operation. Although the new corporation has sustained operations, it has fallen behind schedule.

In June 1978, the F-16 SPO Director designated a special team to review the Sonaca operations and make recommendations for improvement. The team noted areas of weakness in Sonaca's middle management, scheduling, and staffing. It recommended that Sonaca acquire more qualified middle management personnel, especially in technical areas, such as process engineering and configuration management. The team further recommended that Sonaca's future scheduling allow more slack time to accommodate contingencies or unforeseen problems. According to a SPO official, Sonaca's current schedule did not allow any slack time to recover a break in operations of 4 to 5 days or more. Finally, the team recommended Sonaca hire additional employees to reduce and eventually eliminate a bottleneck in the final assembly tasks. GD stated that Sonaca would have to show substantial improvement by August 15, 1978, or other alternatives would be considered. One would be to reduce the volume of work performed at Sonaca and redirect this work to GD.

An F-16 SPO review team visiting Sonaca on August 23, 1978, to assess whether acceptable improvements had been made concluded that progress had been made in each area of concern. Sonaca had hired an additional 50 employees, had

eliminated much of the schedule problems, and was attempting to hire additional qualified middle managers. To help Sonaca meet its delivery schedule, GD increased its early production support.

COPRODUCTION OFFSET

The MOU commits the United States to provide production offset to European industry equal to 58 percent of the procurement value of the 348 F-16s purchased by the EPG and 15 percent of the procurement value of third-country sales. Offset is the value of orders placed with European industry minus the value of any parts or materials EPG industry is specifically directed to purchase within the United States. This value, when divided by the procurement value of EPG F-16 purchases will give the offset percentage.

Status of offset for 348 EPG aircraft

Important issues relating to offset have not been resolved between the United States and the EPGs. The procurement value of the European purchase, against which coproduction offset is measured, has not been officially established; contracts for some coproduced items have not been negotiated; and the suitability of other items for offset has not been determined. Although the U.S. Government and contractors have put forth extensive effort to meet the 58-percent goal, the offset percentage is now estimated at 51.7 percent, based on a tentative agreement that the procurement value of the 348 European aircraft will be \$2.8 billion (January 1975 dollars). About \$180 million additional offset must be placed with European industry to meet the \$1.6 billion (58 percent x \$2.8 billion) offset commitment.

USAF officials believe the shortfall can be reduced to about \$120 million if initial spares, the avionics intermediate shop, and the threat warning system are coproduced. The parties have agreed to coproduce these items, but contracts have not been negotiated.

According to USAF officials, the remaining shortfall of about \$120 million could be achieved through additional spares coproduction and by having USAF-owned F-16s repaired at European depots with the value of the repair work being counted towards the offset. Although the MOU states the United States will use EPG depot facilities on a mutually agreed basis, the United States has stated that EPG depots

will not be used to overhaul or repair USAF aircraft unless it is cost effective. However, the EPGs do not agree. A decision to use EPG depots has not been made.

Status of offset for
third-country sales

The United States must provide offset to the EPGs equal to 15 percent of the procurement value of third-country sales. Although several third countries have expressed an interest in buying the F-16, only Israel has signed Letters of Offer and Acceptance. An approved sale of 160 aircraft to Iran was canceled by that Government. As with the 348 EPG aircraft purchase, the procurement value for the Israeli sale has not been quantified for offset calculation purposes.

The F-16 coproduction participation plan was revised in October 1978, and it included the planned EPG work distribution for the initial third-country sales. The revised plan has been briefed to the F-16 Subcommittee on Industrial Matters and forwarded to the Steering Committee for review.

Until the Israeli procurement value is quantified and the total value of the purchase orders placed by U.S. industry in Europe is determined, the status of coproduction offset for these sales will not be known.

ALLOCATION OF U.S. LOADINGS
TO EUROPEAN PRODUCTS

Loadings is a term used to describe overhead and other charges added to the price of F-16 items and services. Loadings include profit, material procurement and handling charges, general and administrative costs, occupancy expenses, fringe benefits, product liability insurance, and other costs. The EPGs expressed concern that the manner in which loadings are allocated in the United States unduly increases the cost of European-produced parts and, in turn, EPG F-16s and places the European coproducers in a most difficult position.

Loadings applied to
EPG-coproduced parts

U.S. industry typically recovers loading costs by applying a periodically determined rate to the value of an item it processes, such as 5 percent for material handling or 4.3 percent for fringe benefits. Using these rates results in costlier items receiving a larger allocation of the total

overhead. This is based on a causal/beneficial relationship existing between the cost of an asset and the amount of loadings applied to it. This method has evolved as the most efficient and economical way for U.S. corporations to recover these costs. It avoids the difficulty and expense of making more precise allocations.

One of the EPG concerns is that because the same items produced in Europe cost more than when they are produced in the United States, the rate used to recover loadings will allocate more of these costs to EPG products than to U.S. products. The example below demonstrates the EPG concern. We have assumed there are two suppliers, one in the United States and one in Europe, both selling to GD for final assembly the same product for \$100 and \$150, respectively. It is assumed that GD applies a factor of 25 percent to the cost of these products to recover its F-16 loading expenses when setting its selling price.

	<u>U.S. supplier</u>	<u>EPG supplier</u>
Cost of product to GD	\$100	\$150
Loading rate	<u>25%</u>	<u>25%</u>
Loading charge	\$ 25	\$ 37.50

Since the MOU provides that the EPGs will produce 40 percent of the procurement value of the aircraft they purchase and only 10 percent of the procurement value of the USAF aircraft, the EPGs feel they are incurring more than their fair share of the total cost of loadings and because of these loadings the European suppliers are often considered not to be "reasonably competitive", thus reducing their production share. European industry's normal practice is to relate the cost of loadings to the actual benefit received by direct costing. That is, identical or similar items would have the same amount of loadings applied to them, without regard to the cost of the items. The EPGs believe this allocation method precludes the possibility of overstating loading costs by applying fixed rates to like items with different values. In some cases, however, European industries cannot relate the cost of loadings to the benefit received by the end product. In these cases, they recover loadings by using the same method as U.S. industries.

As a result of the EPG concern over the U.S. method of allocating loadings, a group of experts was established to determine the reasonableness of loading charges. To date, three reports have been published and sent to the F-16

Steering Committee. The first of these, dated April 1, 1977, provided insight to the loadings issue but concluded that, because of limited time, it was not possible to determine the reasonableness of loadings by comparing them with the actual benefits received. The other reports were not made available for our review.

CONVERSION OF CURRENCIES

With parts of the F-16 being built in five different countries, costs are being incurred in five different currencies. This creates a need to convert EPG currencies to U.S. dollars and U.S. dollars to EPG currencies.

The MOU established the principle that neither U.S. contractors nor European coproducers should realize financial benefit or loss from fluctuations in the official rates of currency exchange. By establishing this principle, the participating governments agreed to bear the currency conversion risk.

Supplement 1 to the MOU fixed the currency exchange rates at the October 1974 rates, that is, Belgium 38.66 Belgian francs, Denmark 6.015 Danish kroner, the Netherlands 2.663 Dutch guilders, Norway 5.520 Norwegian kroner, and the United States 1.00 dollar. The fixed rate of exchange is for budgeting and other financial accounting purposes, but the actual currency conversion is at the market rate. The currency conversion gain or loss is the difference between the fixed rate of exchange in supplement 1 and the actual rate at the time of conversion.

At least two European coproducers have experienced profits in converting their currency to U.S. dollars. Others are suspected of doing the same thing.

Due to the dollar's decline, the United States has experienced losses in converting U.S. dollars to EPG currencies. If this continues, the United States could bear losses of over \$83 million under the F-16 program.

Coproducer profits from currency conversion

The Currency Clearing House in Brussels operates as a field extension of the Air Force Accounting and Finance Center, Denver, Colorado. It provides accommodation exchange for all U.S. prime contractors and their European subcontractors in accordance with the provisions of the MOU. U.S. contractors purchase EPG currencies to pay progress payments to

their European subcontractors, while European subcontractors utilize the Clearing House to exchange local currency for U.S. dollars and other EPG currencies required to purchase raw materials or pay for miscellaneous subcontracts. By channeling all transactions through the Clearing House, the coproducers can neither gain nor lose through fluctuations in the market value of the currencies.

Since the fixed rates were established, the value of the dollar has declined substantially against the Belgian franc and the Dutch guilder and, to a lesser degree, against the Norwegian and Danish kroner. This means that fewer francs, guilders, and kroner are required to buy one U.S. dollar. If European coproducers bypass the Clearing House and purchase dollars on the open market to obtain the better exchange rates, they will experience a profit from the transaction. In May 1978, for example, a Belgian firm could purchase one dollar for about 33 Belgian francs at a private bank. If that firm went to the Clearing House, it would have to pay the fixed rate of 38.66 Belgian francs, the amount it will be reimbursed under its contract by the U.S. prime contractor for each dollar expended. Using the private bank provides a profit of 5.66 Belgian francs (or 17 percent) for each dollar converted. This type of transaction violates the terms of the MOU.

At least two coproducers have made dollar purchases outside the Clearing House. Contract Administrative Services - Europe and the prime contractor persuaded these firms to change their policy and make restitution to the Clearing House. Several other firms are suspected of avoiding use of the Clearing House, and officials of the Contract Administrative Services - Europe are concerned that the system could break down if the practice becomes too widespread.

This practice by some European coproducers not only provides currency exchange profits which the MOU clearly sought to avoid, but it also penalizes the EPGs because the coproducers take the gains that should have gone to their governments. If the exchange rates fluctuate to a situation requiring a greater amount of foreign currency than the fixed rate to purchase the U.S. dollar, the EPGs will experience a loss. For example, if the exchange rate is 45 Belgian francs to one dollar, a coproducer would go to the Clearing House to buy dollars at the 38.66 Belgian francs fixed rate of exchange. This transaction would result in a loss to the EPGs of 6.34 Belgian francs (or 16 percent) for each dollar conversion. Therefore, as provided in the MOU, the EPGs should receive any gains to offset and minimize losses caused by the exchange rate fluctuations.

We were advised that negotiations are underway to incorporate a contractual requirement on all coproducers to use the Clearing House for currency exchange transactions. Furthermore, officials of the Defense Contract Audit Agency office at the Contract Administrative Services - Europe said they, as well as EPG auditors, are aware of this problem and have provided for the examination of the currency transactions when they perform coproducer progress payment audits.

Currency conversion
results in U.S. losses

Due to the decline in the value of the dollar, the United States has experienced losses in converting dollars to EPG currencies. As of August 31, 1978, the United States has converted \$13.9 million to European currencies so U.S. contractors could make progress payments to the European coproducers. The cost, or loss, to the United States in making the conversions is \$2.2 million, or about 16 percent more than the fixed exchange rates in MOU supplement 1. The U.S. currency conversions and losses as of August 31, 1978, are shown in the following table.

U.S. Conversion of Dollars
to European Currencies as of August 31, 1978

<u>Currency</u>	<u>Dollars</u>	<u>Total cost</u>	<u>Per-</u>	<u>U.S. loss</u>	<u>Per-</u>
	<u>exchanged</u>	<u>of exchange</u>	<u>cent</u>	<u>on exchange</u>	<u>cent</u>
Danish krone	\$ 1,770,000	\$ 1,915,019	108	\$ 145,019	8
The Netherlands guilder	4,000,000	4,717,494	118	717,494	18
Belgian franc	6,500,000	7,785,172	120	1,285,172	20
Norwegian krone	<u>1,650,000</u>	<u>1,698,426</u>	103	<u>48,426</u>	3
Total	<u>\$13,920,000</u>	<u>\$16,116,111</u>	116	<u>\$2,196,111</u>	16

The United States could incur further substantial losses under the coproduction arrangement if the value of the dollar remains at present levels or declines further. If the 58-percent offset is achieved, about \$1.62 billion (January 1975 dollars) in purchase orders will be placed with European industries for production of U.S. and EPG F-16s. This amount consists of about \$520 million in purchase orders for U.S. aircraft components and subassemblies and about \$1.1 billion in purchase orders for EPG aircraft. Thus, the United States

could gain or lose on the conversion of about \$520 million to EPG currencies. This represents the amount of funds related to European production of U.S. F-16 parts and on which the U.S. must exchange dollars for foreign currency for payment to European subcontractors through the U.S. prime contractors. These are theoretical values. The actual values will vary depending on various factors, such as inflation and the success in meeting the MOU offset requirements.

Using the theoretical values and assuming the present currency relationship continues, the cost to the United States could be over \$83 million (16 percent x \$520 million) due to currency conversion.

The gain or loss due to currency conversion is an element of the F-16 multinational program over which the program manager has no control. Currency conversion gains are credited to the U.S. Treasury; however, losses are charged to the F-16 program costs. In recognition of the cost associated with currency conversion, the USAF has now added about \$38 million to the F-16 program estimate.

PROBLEMS CAUSED BY U.S.
PROCUREMENT LAWS AND REGULATIONS

European government and industry officials in all the countries we visited pointed out the serious difficulty they are having complying with U.S. procurement requirements. The subcontracts signed by European coproducers specify that these firms will comply with U.S. procurement regulations and U.S. Cost Accounting Standards (CAS). Officials said they did not realize all the requirements they would have to meet when they signed these agreements, and compliance has become one of the most difficult parts of the program for the European firms.

To comply with the procurement regulations and accounting requirements, some firms have devoted more staffing, time, and expense to paperwork and reporting than they believe justified. According to an official of one firm, high-paid technicians have been used for paperwork because of its complexity and the inexperience of the firm's clerical staff with the U.S. requirements. Some firms have had to adopt dual accounting systems--one for the U.S. system and one for their own country's tax laws.

P&WA planned to award a subcontract to Fabrique Nationale in early 1978 for intermediate and depot-level maintenance on EPG F100 engines. According to USAF officials,

this subcontract with Fabrique Nationale should have been awarded by the end of June 1978 to meet program schedules. However, the subcontract award was delayed due primarily to Fabrique Nationale's objections to the CAS requirements. On September 15, 1978, the CAS Board waived certain requirements for the Fabrique Nationale subcontract, which enabled the contract negotiations to proceed.

Some remaining new CAS requirements affect not only Fabrique Nationale's subcontract for maintenance but all the other coproducers' subcontracts with P&WA. Each of the subcontracts, as well as Fabrique Nationale's proposal for maintenance, was written without regard to the new CAS clauses. The coproducers refused to accept the new standards in their subcontracts with P&WA.

The EPGs asked that the European contracts and subcontracts be exempt from certain cost account standards. EPG and industry officials stated that some relief from the U.S. requirements must be provided before they would participate in a similar coproduction arrangement. They suggested the United States rely on the coproducers to follow their European procurement regulations or modify the procurement regulations and CAS so these requirements would be more adaptable to European business practices. The Board recently granted an exemption to all CAS, except 401 and 402 and disclosure requirements, for foreign contracts and subcontracts.

EPG PARTICIPATION IN THIRD-COUNTRY SALES

The F-16 MOU provides that the EPGs will be given an opportunity to participate in coproduction for all third-country sales, that is, sales of the aircraft to other than the United States and the four EPGs. This aspect of the F-16 program was one of the main attractions for the EPGs when the MOU was signed. Coproduction should be equivalent to 15 percent of the procurement value of all third-country purchases of the F-16 aircraft.

Participation by the Europeans in third-country sales requires the willingness of the governments to accept foreign military sales to potential U.S. customers and the capability of the European industry to accommodate the extra workload created by additional sales. In discussing these issues with government and industry representatives in the four countries, all the industry officials were generally confident their firms would be willing and able to participate in the sales; and they were eager to see the program reach its full sales potential.

Although government officials in two countries foresee no problem with third-country sales, officials in the other two countries are somewhat politically concerned about this issue. They see no insurmountable problems, however, and expect their countries to receive the benefit of all sales, perhaps by producing parts for U.S. aircraft instead of for third countries.

GD's coproduction manager explained the importance of having all countries participate in all third-country sales. The MOU provides that if a country chooses not to participate in a particular sale, it shall be compensated by a larger percentage of participation on other third-country sales. The GD official said that in practice such a situation would create serious production management problems.

European firms are confident they can meet the production demands of third-country sales, but they could have some problems if too many countries want delivery of their aircraft simultaneously.

Many officials would prefer that third-country sales come after the production runs for the initial U.S. and EPG buys. This would extend the production runs, make better use of the plant and equipment investments made for the program, and stabilize the workload and the employment levels at the companies.

According to the GD European coproduction manager, each of the European assembly lines will have a capacity of three aircraft a month; and it would be difficult for them to increase productivity to meet additional delivery demands for third-country sales.

Both GD and P&WA are optimistic that the European coproducers are capable of participating in third-country sales. P&WA has no concerns in the capability of the four European coproducers to produce engines in support of the contemplated third-country aircraft sales to be delivered through 1984. P&WA's subcontracts with the coproducers already provide for enough engines to support those third-country sales in addition to the engines or parts in support of the EPG F-16s and USAF F-16s.

COST IMPACT OF COPRODUCTION ON USAF AIRCRAFT

Department of Defense officials have recognized from the beginning of the F-16 multinational program that USAF

F-16s would cost more because of coproduction. Costs would increase primarily because of the use of multiple production lines, higher European production costs, and higher inflation rates in EPGs. USAF officials have contended, however, that the increase in aircraft procurement quantities as a result of EPG participation should lower the cost of domestic production enough to offset these increased costs. The Secretary of Defense stated the program would be managed so the added cost of coproduction would be no greater than the benefits received from the economies of scale achieved by the larger production quantity.

In February 1978, the Undersecretary of Defense, Research and Engineering, testified before a Senate subcommittee that the F-16 program had not achieved the economies of scale initially anticipated. USAF projections of available cost data have indicated a coproduction cost impact ranging from \$70 million to \$241 million.

The most recent study, completed in October 1977, indicates a cost impact of \$142 million. This study, however, excludes the coproduction cost impact of several items, including the threat warning system and the avionics intermediate shop. The decision to coproduce these items was made after completing the study.

Although the October 1977 study indicates a coproduction cost impact of \$142 million to the F-16 program, it also concludes that about \$369 million in economic benefits could be realized by the U.S. Government. These benefits consist primarily of recouping U.S. research and development costs from the EPGs, sharing production overhead costs with the EPGs, and increasing employment at U.S. contractors and thereby increasing the U.S. income tax-base.

In a previous report ^{1/}, we recommended that the Secretary of Defense develop a cost accumulation and estimating system to accurately show the effect of EPG coproduction on USAF aircraft costs. In response to our recommendation, the Undersecretary of Defense, Research and Engineering, said Defense officials recognize the need to track these costs and they are continuing to refine an annual estimate to assess the net effects of coproduction on the USAF 650 aircraft program. Although an estimate was made in October 1977, F-16 Program Office officials said they had not been directed to conduct an annual estimate in 1978.

^{1/}"Sharing the Defense Burden: The Multinational F-16 Aircraft Program," dated Aug. 15, 1977.

After we called their attention to this matter, USAF Headquarters officials directed that data be developed regarding the benefits of F-16 coproduction, cost impact of coproduction, status of the EPG not-to-exceed estimate, and coproduction offset. The results of this study will be available this year.

We believe such an assessment is essential, especially when considering the feasibility of other coproduction programs, as well as coproduction of the USAF follow-on buy of 738 F-16 aircraft.

RELIABILITY IMPROVEMENT WARRANTY

The F-16 contract with GD included a reliability improvement warranty (RIW) option which warranted certain avionics components on USAF F-16s for 300,000 flying hours or 4 years, whichever occurs first. According to GD, this warranty covered 301 aircraft. If the warranted components failed during the warranty period, GD would be required to repair them and provide spares while the failed parts were out of service. The option price for the RIW clause was about \$18.8 million (fiscal year 1975 dollars).

The option further stated that if the EPGs desired RIW coverage, the warranty would be extended to include their F-16 aircraft, subject to appropriate price adjustments for the extended coverage, including consideration of quantity of units purchased, operating time, use location, and operations environment.

After the MOU was signed, the EPG officials stated their intent to procure RIW coverage, but GD proposals to cover EPG aircraft were unacceptable. To obtain coverage acceptable to the EPGs, the United States decided to negotiate a combined U.S./EPG contract. GD proposed an RIW not-to-exceed price of \$30.5 million (fiscal year 1975 dollars) for 300,000 flying hours or 4 years, whichever occurs first. The United States and EPGs accepted GD's proposal and, on February 3, 1977, the F-16 SPO awarded a contract to GD at the not-to-exceed price of \$30.5 million. This contract covered 250 USAF and 192 EPG aircraft for a total of 442.

The original RIW clause provided the United States 300,000 flying hours or 4 years of coverage, whichever occurs first, at a price of \$18.8 million, or \$62.67 per flying hour. Based on a coverage of 301 USAF aircraft, this amounts to \$62 500 (fiscal year 1975 dollars) per aircraft.

The current contract covers 442 aircraft for 300,000 flying hours or 4 years, whichever occurs first, to be shared by the United States and EPGs at a not-to-exceed price of \$30.5 million. Based on coverage of 442 USAF and EPG aircraft, this is an average cost of \$69,000 per aircraft. However, based on estimated flying hours and the number of aircraft covered for each country, the Multinational Steering Committee has projected the U.S. share of this cost to be \$108.50 per flying hour. Although the final price for the RIW contract has not been negotiated, it appears the United States, by sharing an RIW with the EPGs, will receive the warranty coverage it was originally offered, but for a smaller number of aircraft and at a substantially increased cost.

CHAPTER 3

F-16 PROGRAM OBJECTIVES AND BENEFITS FOR EUROPEAN PARTICIPATING GOVERNMENTS

European government and industry officials are generally satisfied with the progress of the F-16 program and believe it is achieving most of the objectives and providing the benefits they expected. In certain areas, however, some officials believe more needs to be done.

The objectives of the EPGs are to

- acquire a low-cost, easily maintained aircraft with advanced avionics and weapons capability;
- standardize aircraft in NATO;
- acquire advanced technology; and
- make optimum use of European industrial, economic, and technical resources in the production of the aircraft.

European officials believe the first two objectives are being achieved satisfactorily. According to some EPG officials, however, the technology transfer has not been all they had hoped for and the use of resources as envisioned in the co-production offset commitment still requires further effort to fulfill.

This chapter discusses the EPG objectives and provides the views of the European governments and coproducers on how well these objectives are being met.

ACQUISITION OF LOW-COST AIRCRAFT

The MOU stipulates a not-to-exceed unit price of \$6.091 million (January 1975 dollars) for the EPG F-16 aircraft. All the European governments indicated they were confident this objective was being met. The elements comprising the not-to-exceed price and the USAF's latest estimates are shown below.

Comparison of Not-to-Exceed Price
to Air Force Estimate in Millions of January
1975 Dollars as of October 24, 1978

<u>Element</u>	<u>Price</u>	<u>Air Force estimate</u>
Airframe	\$3.450	\$3.354
Engine	1.445	1.506
Radar	.372	.372
Government-furnished equipment	.186	.186
Full-scale development recoupment	.470	.470
Duplicate tooling	.196	.196
Industry management	.005	.006
	<u>\$6.001</u>	<u>\$6.090</u>

The \$3.354 million airframe estimate is based on the negotiated price incorporated in the GD contract for 348 EPG aircraft. Negotiations on the radar production price are currently underway, and the EPG price is projected to be no more than \$372,000. The government-furnished equipment estimate increased to \$186,000 due to configuration changes and increases in quantity. The full-scale development recoupment and duplicate tooling are fixed amounts stated in the Letter of Authorization and Acceptance. Industrial management has increased because it was understated in the initial estimate.

Although the USAF's total current estimate is slightly less than the not-to-exceed price, the engine estimate has exceeded its individual not-to-exceed price. This estimate, however, and even the engine price of \$1.445 million remains uncertain until the pricing of the F-16 engines to be delivered in fiscal years 1981, 1982, and 1983 is accomplished and the U.S. Government and P&WA agree on what constitutes a fiscal year 1975 dollar.

Presently, P&WA is under contract to deliver 148 EPG F-16 engines through fiscal year 1979. Prices of the remaining 290 EPG engines to be delivered in fiscal years 1981, 1982, and 1983 are planned to be negotiated and made part of the basic F-16 engine contract in subsequent years. However, the USAF is currently estimating that the average unit price will be \$1.506 million, exceeding the not-to-exceed price by \$61,000. Until finally negotiated, this estimate is subject to further revisions.

Although the engine not-to-exceed price is stated in fiscal year 1975 dollars, the USAF and P&WA do not agree on what constitutes a fiscal year 1975 dollar. The USAF's position is that a fiscal year 1975 dollar is as of January 1975. P&WA's position is that a fiscal year 1975 dollar is as of July 1974, the time it priced its proposal. The table below illustrates the difference in the two positions.

Difference in Engine Not-to-Exceed Price
between a July 1, 1974 and January 1, 1975
Fiscal Year 1975 Dollar

	<u>July 1974</u>	<u>January 1975</u>
	------(millions)-----	
P&WA	\$1.445	\$1.590
USAF	1.310	1.445

The impact of P&WA's position of \$1.445 million in July 1974 dollars is a potential increase of \$145,000 per engine, or about \$64 million (\$1.590 million - 1.445 million x 438 engines). The USAF current estimate of \$1.506 million is \$61,000 per engine, or about \$27 million over the engine not-to-exceed price. Should P&WA's position prevail, we believe this \$27 million and any additional increases over the engine not-to-exceed price up to \$64 million (1975 dollars) would represent additional cost to the EPGs.

If the USAF's position prevails, there would be no additional cost to the EPG and increases over the \$1.445 million engine not-to-exceed goal would be absorbed by P&WA. According to USAF officials, this matter has not been resolved.

MAINTAINING COMMONALITY BETWEEN
USAF AND EPG F-16s

Much emphasis has been placed on maintaining commonality between USAF and EPG aircraft. Most engineering changes to the F-16 have been accepted by all nations as common changes although the development costs of these changes are not always shared by the participating countries. The EPGs have adopted only three changes that are peculiar to their aircraft; however, European officials do not believe these changes will hamper standardization or interoperability.

Peculiar changes and sharing of costs

At the outset of the program, the EPGs identified peculiar requirements for their aircraft that were deviations from the baseline configuration. We reviewed the disposition of these deviations and other proposed changes to determine the extent F-16 commonality is being maintained and costs are being shared.

Costs of engineering change proposals (ECPs) to the F-16 are to be shared using the following criteria:

- If any member of the F-16 multinational coproduction program requests an ECP to implement a peculiar requirement which is neither accepted nor implemented by the other members, that member must pay all the nonrecurring (development) and recurring (production) costs of the ECP.
- If an ECP improves the baseline configuration, the country or countries accepting and implementing the changes will pay a pro-rata share of the cost associated with the ECP preparation and both development and production costs.
- If any ECP is necessary to meet the baseline configuration, it will be funded by the U.S. Government and the EPGs will not be charged for the nonrecurring costs.

EPG peculiar requirements

The preliminary contracts between the United States and the EPG included 14 peculiar optional items which the EPGs required for their aircraft. Of these, five have been canceled, six have been accepted and implemented by all participating countries, and three have remained peculiar requirements for the EPGs.

For the six items accepted, we found the development and production costs were properly shared except for the sea-clutter elimination and the radar-picture-freeze capabilities. The United States was absorbing the entire development costs estimated at \$1.67 million for these two changes. In discussing this cost allocation with F-16 SPO officials, they agreed that the development costs should be shared. Subsequently, the F-16 officials reallocated these costs to the

five coproducing nations on a pro-rata share basis. The United States will now be able to recover development costs of about \$290,000 from the EPGs.

The three items that have remained EPG peculiar are adding the drag chute for Norway, adding the identification light for Denmark and Norway, and deleting the very high frequency omnidirectional range/instrument landing system for Belgium and the Netherlands. The requesting countries are to be properly charged for the costs of these items.

Other ECP development costs not
charged on a pro-rata basis

We reviewed eight additional ECPs to determine the reason for the change and how the costs were shared. Three changes were necessary to meet the baseline configuration requirement for a safe and reliable aircraft. The development costs for these ECPs were properly charged to the U.S. Government as specified in the Letters of Offers and Acceptance.

Three other ECPs provided an improved capability for the F-16 and were accepted by all five countries. However, the development costs estimated at \$9.7 million were charged to the United States rather than to all five governments on a pro-rata share basis. This is inconsistent with the terms of the Letter of Offer and Acceptance. Although the EPGs will pay for incorporating the changes into production aircraft, their share of the development costs, estimated at \$1.7 million, will be absorbed by the United States. According to F-16 SPO officials, the EPGs did not have a requirement for these three ECPs but accepted the changes to maintain a common aircraft configuration. These officials stated it would cost more to provide these capabilities on U.S. aircraft only than on both U.S. and EPG aircraft. They had not made a cost analysis, however, to support this assumption.

Although the two remaining changes were required to meet the baseline configuration, they also provided improved aircraft capability. The EPGs agreed to pay the production costs, but the United States will pay the entire development cost, estimated at \$2.1 million. There was no attempt to identify development costs applicable to improved aircraft capability or to share such costs on a pro-rata basis.

Electronic countermeasures system

The USAF and European Air Forces have not agreed on a standardized electronic countermeasures system for the F-16. Although the USAF Tactical Air Command wants an internal system, the USAF has directed that an existing external pod be used. Belgium, on the other hand, is considering using its own internal system in its F-16s. Although it has tried to convince the other European countries to use its system as well, many EPG officials said their countries would not use the Belgian system.

STANDARDIZATION OF NATO AIRCRAFT ENHANCED BY F-16 PROCUREMENT

The United States and European allies have strongly endorsed efforts to standardize weapons used by NATO military forces. Purchase of the F-16 by the four European Air Forces and deployment of large numbers of U.S. F-16s in Europe should enhance this standardization. European government officials believe the objective of standardization of NATO aircraft is being met by the F-16 multinational program.

Use of NATO standard fuel

One standardization issue still to be resolved is the choice of fuel to be used by the U.S. and European countries. JP-8, an essentially commercial jet fuel with icing and corrosion inhibitors added, has been chosen as the NATO standard aircraft fuel. The F-16 engine, however, was designed to use the standard USAF jet fuel, JP-4.

The feasibility of using JP-8 in the F-16 has been under study for about 2 years. Preliminary testing by both GD and P&WA has shown that JP-8 fuel is compatible with the F-16 engine. When compared to JP-4, the tests showed JP-8 has no performance penalty and improved ground handling safety. JP-8 requires slightly greater aerial restart speeds, however, and has reduced ground starting capability in temperatures below -20 degrees Fahrenheit.

European Air Force officials plan to use JP-8 for their aircraft. The USAF in Europe is also planning to convert its aircraft in the United Kingdom from JP-4 to JP-8. If there are no problems, the entire European force could be converted, including any F-16s eventually stationed in Europe. The USAF has set as its objective the orderly conversion of European/USAF forces from JP-4 to JP-8 fuel,

the logistically preferred fuel for the European area. Future testing of JP-8 in the F-16 will be conducted as required to meet this objective. This change to JP-8 fuel would improve NATO interoperability.

F-16 interoperability and interchangeability

Interoperability is the ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together. Increased interoperability is recognized as offering a considerable measure of added military capability while avoiding many political and economic considerations standing in the way of more complete standardization.

One European official pointed out that the F-16 program is encouraging more tactical and operational cooperation as well as standardizing the weapon itself. The participating Air Forces are working together to develop and implement common tactics to be used with the F-16. This same cooperation is evident in the planning for F-16 logistical support. Numerous working groups are studying common supply, maintenance, and training programs.

The F-16 armament will have little interchangeability with the armament of other NATO countries. Except for the British BL-755 cluster bomb and the French MATRA-250 general purpose bomb, which are to be certified, the F-16 will accept only U.S. armament. Other NATO weapons will be considered for future certification. In addition, consideration will be given to modifying the weapon pylon to provide for a common NATO interface.

TRANSFER OF ADVANCED TECHNOLOGY TO EPG COPRODUCERS

As part of the F-16 program, the European countries sought to obtain advanced data, technology, and technical assistance. Overall, much new technology has been made available to European companies, and numerous examples illustrate the beneficial effects of this sharing. According to some government and industry officials, however, technology transfer has not been as extensive as originally expected.

Almost all the government and industry officials gave high marks to the U.S. contractor and subcontractor representatives for cooperation and openness in this technology area. They know of no instances where U.S. firms withheld data or assistance that should have been released to the European company. They cited many examples of beneficial new technology being obtained by European firms as a result of F-16 coproduction. For instance:

- Sabca, a Belgian aircraft company, is gaining valuable new experience building and testing the advanced servoactuators used in the F-16's "fly-by-wire" system.
- DIG-I representatives in Denmark told us the contract for fire control computers will give them a production capability which is unique in Europe.
- KV, a large Norwegian firm, is entering a program to develop and produce a commercial maritime gyrocompass based on experience and technology gained through the F-16 program.
- DAF, a Dutch company which had never been involved in aircraft components, is now building F-16 landing gear with substantial technical assistance from the U.S. coproducer.

Some firms have gained entry to new technology areas which may have been out of reach without the F-16 program. One Danish firm, for example, manufactures radiators and industrial cooling equipment. This firm was selected to coproduce the F-16 heat exchangers, a type of product it had not made before.

Despite the beneficial aspects of the technology transfer associated with the program, some Norwegian Government and industry officials had expected more technology transfer. One condition cited was a lack of final assembly and the testing of full subassemblies. Much of the work assigned to Norway was described as producing components to be shipped back to the U.S. coproducer for assembly, more of a vendor operation than actual coproduction.

One Norwegian firm, specializing in microwave radio links, wanted to participate in the radar coproduction program. Instead of getting a major electrical component, however, it was awarded the radar rack--hardly a product that would fit its experience or enhance its microwave

technology. According to USAF officials, changes had to be made to the radar coproduction program because of the greatly increased cost of coproduction of higher technology radar parts. Since our visit, we learned this firm was selected to coproduce an electronic threat warning device, which will be beneficial in providing modern technology. Officials pointed out that even if the transfer of product technology was not at the expected level, the coproduction, in most cases, added new production technology to the capability of Norwegian industry.

Some coproducers in Europe had also hoped to gain new experience in the use of graphite composite materials for mass production. However, the amount of these materials planned for use in the F-16 has been reduced because of design trade-offs. The remaining graphite composite material production has been retained for U.S. firms.

USE OF EUROPEAN ECONOMIC AND INDUSTRIAL RESOURCES

By placing a significant portion of the manufacturing work with firms in the four European participating countries, the F-16 program has created new jobs, prevented layoffs, and stimulated capital investment in Europe. These economic benefits have been achieved through the offset provision of the MOU, which called for U.S. contractors to place work with coproducers. Although European officials are generally pleased with the favorable economic impact so far, Norwegian and Danish officials desire a more equitable sharing of the coproduction offset. We discussed the economic impact of the program with government and industry officials in Europe and sought their views on how well the offset provision is being met.

Economic impact--employment, investment, and commercial applications

European government officials were unable to give us precise figures on the number of jobs created by the F-16 program or the total number of people employed in F-16 work. Based on our interviews with officials of selected coproducers, it appears the program has resulted in the creation of hundreds of new jobs in Europe. However, the most significant impact seems to be that companies were able to stabilize employment and guarantee a steady workload during the life of the program. Officials gave us this country-by-country rundown of the employment effects:

- In Norway, Government officials pointed out, the F-16 program created new jobs. In addition, it allowed a large Government defense contractor to move some of its work to new factories in less-developed areas of the country.
- Denmark has a high unemployment rate, so the jobs made available by the F-16 coproduction were quite welcome. One Danish firm official said the program prevented a planned layoff of some employees. Another said it will hire new workers at the peak of the F-16 program.
- Fokker, the major firm in the Dutch aircraft industry, had faced declining sales and production when the F-16 program came along. Fokker was not going to lay off employees, but it reduced work hours and allowed the labor force to decrease by attrition. The F-16 allowed Fokker to restore full work weeks and fill vacant positions. DAF, another large Dutch firm, created an entire new division for the F-16 program and will require new employees.
- Belgian officials said the F-16 program will employ many workers at its peak in Belgium. The division of an aircraft firm, gone bankrupt, could survive by being involved in the F-16 program. Furthermore, the F-16 work will represent about two-thirds of the total production of the engine division for Fabrique Nationale.

Some European firms, with assistance from the governments, have made substantial capital investment for the F-16 program. Again, overall figures are difficult to compile, but government officials' estimates total close to \$200 million. Companies have invested in new buildings, modern new machines, and advanced test equipment. According to some officials, the investments are quite large compared to previous programs and in many cases cannot be paid off by the F-16 program alone. Companies are planning to open new markets for products to fully use the capital invested. The Belgian engine coproducer estimated its total investment for the F-16 at about \$90 million. DAF, in the Netherlands, built and equipped an entire new factory, with investments expected to total nearly \$9 million. The Norwegian firm, KV, expanded its facilities and purchased new machine tools at an estimated cost of about \$34 million.

According to some officials, the key to the F-16 program's attractiveness was the possibilities it offered to use the labor, capital, and technology for future commercial projects. For example, DAF hopes to use its newly found capability in building landing gears to expand into a wide variety of future commercial products. The program has allowed several firms to expand and modernize their facilities and has fostered greater cooperation between European and U.S. firms, which could help future business.

Distribution of offset

The offset percentage achieved by the United States under the 998 aircraft program can only be determined after an agreement is reached on the procurement value of the 348 EPG aircraft. Currently, the USAF estimates the offset to be 51.7 percent. European officials expect further action by the United States to increase the offset.

The bulk of the coproduction offset has gone to Belgium and the Netherlands, where final aircraft assembly lines are set up and final engine assembly will be done. Government officials in these two countries are generally satisfied with the offset. Norway and Denmark, however, have received a smaller offset, and their officials are calling for a more equitable sharing of the offset. They recognize that in the MOU the offset applied to the consortium as a whole, but they believe the Scandinavian countries should get their fair share of the full 58-percent offset. The following schedule shows the percentage of the total offset received by each EPG in comparison to its aircraft purchases.

Comparison of EPG Buy of F-16s to Offset Received as of September 30, 1978

	<u>EPG F-16 buy</u>		<u>Purchase orders</u>	
	<u>No. of</u>	<u>Procurement</u>	<u>(note a)</u>	
	<u>aircraft</u>	<u>value</u>	<u>Amount</u>	<u>Percentage</u>
	------(millions)-----			
Belgium	116	\$ 878.9	\$ 622.5	70.8
Denmark	58	449.2	148.8	33.1
The Nether-				
lands	102	800.5	407.0	50.8
Norway	72	671.4	269.1	40.1
Total	348	\$2,800.0	\$1,447.4	51.7

a/Does not include third-country sales.

Extensive efforts are being made to increase offset on a more equitable basis. Coproduction of the avionics intermediate shop will place over \$20 million of coproduction work with a firm in Denmark. Of the 144 test stations projected to be procured, a maximum of 36 will be coproduced. It is estimated, however, that avionics intermediate shop coproduction costs will exceed U.S. production costs by about 20 percent. Despite the increased costs, U.S. and EPG officials have agreed to award coproduction of the avionics intermediate shop to help achieve the 58-percent offset goal and to place more offset value in Denmark.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The European governments and coproducers, the U.S. Government, GD, P&WA, and other U.S. contractors have made substantial progress in implementing the F-16 multinational program. The coproduction requirement has created numerous challenges previously not present in acquiring U.S. aircraft. Identifying parts and components suitable for coproduction; selecting capable European contractors with reasonably competitive prices; negotiating contract terms; complying with U.S. procurement regulations, CAS, and coproduction offset requirements; and meeting other program commitments have complicated this effort. However, all participants working cooperatively have met the challenges thus far.

The following observations highlight the program's progress and concerns that will require further attention and resolution.

U.S. contractors have issued purchase orders totaling over \$1.4 billion to 30 European coproducers, about \$180 million less than needed to achieve the U.S. coproduction offset commitment of 58 percent. Since most of the purchase orders have been placed in Belgium and the Netherlands, Denmark and Norway want a more equitable sharing of the coproduction offset. USAF officials are searching for ways to make up the shortfall and, to the extent possible, price purchase orders on a more equitable basis.

It has been necessary for U.S. contractors to supply more parts and components to some European manufacturers than initially planned to validate the interchangeability of production lines and to keep the production program on schedule until the European-produced parts are available. Because of its operations problems, there is a continuing need to closely monitor the performance of Sonaca, a coproducer that will manufacture aircraft components.

Europeans are concerned that the manner in which U.S. overhead allocated to the coproducers' products unduly increases the cost of European parts and aircraft. Although this has been the subject of several task force studies, it is still unresolved.

At least two European coproducers have profited in converting their currency to U.S. dollars, and others are suspected of doing the same thing. This practice is a violation of the provisions of the MOU between the U.S. Government and the EPGs. Actions are underway to control this matter. In addition, due to the dollar's decline, the United States has been subjected to increased costs under the F-16 program. The cost to the United States due to currency conversion could be over \$83 million.

European government and industry officials have pointed out serious difficulty in complying with U.S. procurement regulations and CAS. They would like some relief from certain U.S. requirements before they participate in future coproduction arrangements, and have suggested that they be allowed to follow their own government regulations or modified versions of U.S. regulations adaptable to European business practices. The CAS Board has recently granted an exemption to CAS, except 401 and 402 and disclosure requirements, for foreign contracts and subcontracts.

Although U.S. and European government and industry officials expressed confidence that European industry could increase production to support third-country sales, there remains some question as to the willingness of European governments to do so because of political concern about the coproduction of items for export to some third countries. EPG officials, however, see no insurmountable problems and expect their countries to receive the benefit of all sales, perhaps by producing parts for U.S. aircraft instead of third countries. To date, the United States has agreed to sell 75 aircraft to Israel. An approved sale of 160 aircraft to Iran was recently canceled by that Government.

Although the Undersecretary of Defense, Research and Engineering, stated the Department of Defense is continuing to exercise and refine an annual estimate of the cost impact of coproduction on the USAF 650 aircraft program, no estimate was made in 1978. The Air Force has subsequently directed that data be developed regarding the cost and benefits of F-16 coproduction and the results of this study should be available this year.

GD offered a reliability improvement warranty to the USAF on some F-16 avionics components. Its proposal to the EPGs for a similar warranty was unacceptable to them. Consequently the United States negotiated a combined U.S./EPG warranty. This warranty is \$30.5 million or \$69 thousand

per aircraft. Although the single warranty would have cost \$62.67 per flying hour, the U.S. share of the combined warranty cost is projected to be \$108.50 per flying hour. By sharing the reliability improvement warranty program with the EPGs, the United States is obtaining the same warranty it was originally offered, but for a smaller number of aircraft and at a substantially increased cost.

Although the engine cost estimate is greater than its not-to-exceed goal, the USAF's overall estimate as of October 24, 1978 is slightly under the \$6.091 million (January 1975 dollars) MOU not-to-exceed goal for EPG aircraft.

The USAF and P&WA disagree as to the definition of a fiscal year 1975 dollar. If the Air Force argument prevails, P&WA will have to absorb any costs over the \$1.445 million (January 1975 dollars) engine not-to-exceed price specified in the MOU. If P&WA's argument prevails, the EPG would have to pay about \$27 million more than anticipated, based on the USAF's current estimate of the EPG engine price, and would have to absorb any future engine cost increases up to \$64 million (1975 dollars).

The F-16 will provide a standardized weapon system for five NATO countries. Emphasis has been placed on maintaining commonality between United States and EPG aircraft. Most engineering changes have been accepted by all participating nations, although the development costs of these changes are not always shared. In addition, efforts are underway to demonstrate the feasibility of using JP-8 as the NATO standard aircraft fuel. If no problems develop, the USAF could convert its entire European force, including the F-16 to JP-8. This change to JP-8 would improve NATO interoperability.

Except for the British BL-755 cluster bomb and the French MATRA-250 general purpose bomb, the F-16 will have little interoperability with the armament of other NATO countries. Efforts are underway to encourage more tactical and operational cooperation, including such areas as common supply, maintenance, and training. Also, current plans call for standardizing aircraft fuel in Europe.

U.S. contractors have made new technology available to European manufacturers through the F-16 program. Although many examples can be cited illustrating the benefits of this sharing, some European government and industry officials believe that technology transfer has not been as extensive as originally expected.

RECOMMENDATIONS

The F-16 Program Director and other USAF and contractor officials are aware of the concerns in the multinational aircraft program and have acted to alleviate most of them. The following recommendations are additional actions necessary to improve F-16 program management. We recommend that the Secretary of Defense:

- Establish a consistent practice for U.S. dealings with European governments and industries in coproduction programs in consultation with the CAS Board and the Office of Federal Procurement Policy.
- Require that cost estimates on the impact of coproduction on USAF aircraft costs are made at least annually.
- Determine whether a prompt resolution of the disagreement between the USAF and P&WA is needed to help both the EPGs and the U.S. Government in assessing this cost impact.
- Require the USAF to review the cost sharing of all approved and future F-16 engineering changes to make sure development costs are shared according to the MOU.

(951346)

DA
FILM

7